

Oxonica v. Neuftec: Nanoparticle Fuel Additive Litigation in the United Kingdom

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ABSTRACT

Nanotechnology innovations will advance the energy and environmental fields. The catalytic particles that comprise the Envirox 2 fuel additive, produced by Oxonica Energy Limited, promise to improve the efficiency of and reduce pollution emitted by automobile engines. In February 2007, Oxonica filed suit seeking a declaratory judgment that (a) Envirox 2 does not fall within the scope of Neuftec Limited's European patent; and (b) Oxonica does not owe Neuftec licensing fees. In this article, IP lawyers Lars Genieser and Henry Daley discuss patent strategy for nanotechnology within the framework of the pending Oxonica v. Neuftec case.

I. INTRODUCTION

On February 23, 2007, Oxonica Energy Limited of Oxford, United Kingdom filed suit in the Patents Court of the United Kingdom's High Court of Justice against Neuftec Limited of Roseau, Dominica.¹ Oxonica is seeking a declaration that its Envirox 2 fuel additive does not fall within the scope of Neuftec's European Patent No. 1 299 508, and that Oxonica does not owe Neuftec licensing fees for sales of Envirox 2.² In its Amended Defense and Counterclaim, Neuftec stated that Envirox 2 was within the

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¹ See Amended Particulars of Claims at 4, *Oxonica Energy Ltd. v. Neuftec Ltd.*, Claim No. HC07 C00437 (Patents Court, High Court of Justice, UK filed April 9, 2007); See also Katharine Sanderson, *Nanotech Growing Pains*, 446 NATURE 963 (2007).

² *Id.*

scope of the license, and that Oxonica owed Neuftec royalties.³ At the time of writing, the Court is still presently considering the case.⁴

Although public information is limited because the outcome of the dispute is yet to be determined, this *Oxonica* case provides a useful framework for considering patenting, licensing, and business strategies for commercial nanotechnology products. Some consider this stage of nanotechnology to represent the first generation of nanotechnology innovations. First generation nanotechnology innovations can be characterized as being capable of generating revenue in the short term, suitable for incorporation into existing products or processes that generate products sold to consumers (as opposed to generating new markets), and having straightforward functionality. Given the limited public information available, several of the scenarios discussed herein are hypothetical and are intended to illustrate the patenting, licensing, and business issues discussed. Nonetheless, this case raises several strategic intellectual property issues that should be of interest to the nanotechnology community, irrespective of whether they are actually at play in this case.⁵

II. BACKGROUND OF THE DISPUTE

On January 12, 2005, Neuftec received European Patent Number 1 299 508 B1 for “a fuel additive.”⁶ Inventors Ronan Hazarika and Bryan Morgan present a method of improving the efficiency of the burning of a fuel by dispersing particles of a lanthanide oxide, for example, cerium oxide, coated with an alkyl carboxylic anhydride.⁷ The patent states that, among providing other benefits, the additive can improve the fuel efficiency of automobile engines.⁸ During the combustion process, rare earth oxides are formed from the nanoparticles and act to catalyze the combustion of asphaltenes,⁹ high molecular weight molecules in the fuel. The patent indicates that the alkyl carboxylic anhydride coating is important to allow solubilization of the lanthanide oxide particles in the fuel and to prevent the particles from prematurely reacting with the fuel prior to combustion.¹⁰

Although the broadest claims do not limit the size of the lanthanide oxide particles to a nanometer range, dependent claims require that particle sizes range: from 1 to 50 nm; and from 1 to 10 nm.¹¹ The patent description states that a small particle size is preferable to promote dispersion of the additive in fuels.¹² A small particle size enhances catalysis induced by the particles: smaller particles have a higher ratio of surface area-to-volume; and smaller particles, having a smaller radius of curvature, have more highly stressed surface atoms which are extremely reactive. The particles should be sufficiently small not to block filters or otherwise interfere with the function of an internal combustion engine. A similar U.S. Patent, number 7,195,653, was issued to the same inventors on March 27, 2007.¹³ Review of the

³ See Amended Defense and Counterclaim at 3, *Oxonica Energy Ltd. v. Neuftec Ltd.*

⁴ **Editor’s Note:** After submission of this article, the Court rendered its decision in the case in favor of Neuftec. See *Oxonica Energy Ltd v Neuftec Ltd* [2008] EWHC 2127 (Pat) (05 September 2008), available at <http://www.bailii.org/ew/cases/EWHC/Patents/2008/2127.html>.

⁵ These hypothetical scenarios are not intended to forecast the UK High Court of Justice’s pending ruling or as commentary on the merits of such a ruling. This article is not presenting specific legal advice, but instead is describing issues pertaining to general intellectual property strategies.

⁶ EPO Patent No. 1299508 B1 at 1 (filed June 29, 2001).

⁷ See *id.* at col.2.

⁸ See *id.*

⁹ See *id.* at col.1.

¹⁰ See *id.* at col.4.

¹¹ *Id.* at col.3.

¹² See *id.*

¹³ U.S. Patent No. 7,195,653 (filed June 29, 2001).

publicly-available history of prosecution of this patent suggests that the U.S. Patent and Trademark Office (“PTO”) allowed it on the basis of the alkyl carboxylic anhydride coating.

The inventors, Ronan Hazarika and Bryan Morgan, licensed the European application along with the yet-to-be-issued European patent number 1 299 508 B1 to Oxonica in a December 7, 2001 agreement, in which Oxonica agreed to pay Neuftec a 5% of net sales royalty.¹⁴

In its complaint, Oxonica maintains that the Envirox 2 product it sells is not covered by any of the claims of the European patent, so that no license fees are due.¹⁵

Oxonica has sought and obtained its own patents on fuel additive compositions. For example, on January 30, 2007, the PTO issued Patent No. 7,169,196 to inventor Gareth Wakefield which was assigned to Oxonica Materials Limited.¹⁶ The patent presents a method of improving the combustion of a fuel by adding particles of cerium oxide, a lanthanide oxide.¹⁷ Oxonica’s claims differ from Neuftec’s in requiring that the cerium oxide particles be “doped” with another metal, such as copper.¹⁸ Oxonica’s patent indicates that this doping increases the oxygen storage capacity of the cerium oxide particles, and that this allows the particles to oxidize hydrocarbons and to reduce nitrogen oxides to decrease pollution.¹⁹ The broadest claims of the patent do not limit the particles to a specific size; however, a dependent claim requires that the particles have a size of from 1 to 300 nm.²⁰ Furthermore, the description states that the size must be small enough for the particles to be a stable dispersion in the fuel, and, because the catalytic effects are dependent on surface area, small size renders the particles more effective as catalysts.²¹ Review of the publicly-available history of prosecution before the PTO for this patent suggests that the PTO allowed it on the basis of the doping of the cerium oxide. Although Oxonica’s broad independent claims do not require that the particles be coated, dependent claim 11 of U.S. Patent No. 7,169,196 specifies an anhydride coating and dependent claim 12 specifies a coating with “oleic acid or dodecylsuccinic anhydride.”

III. A FEW PATENT STRATEGIES

A patent provides its owner with the right to exclude another from making, using, or selling the patented technology. The claims of the patent define the extent of the owner’s rights. Claim language is concise and must meet the formal requirements of the jurisdiction issuing the patent.²² A general rule of thumb is that the more a claim says, the less it covers. For a claim to be infringed, every one of its limitations must be found in the potentially infringing product or process. This is often referred to as reading the claim on the accused product or process. Sometimes, however, a product or process can infringe a claim even if a limitation is not identically present so long as a substitute is found to be sufficiently close under the legal concept called “the doctrine of equivalents.”

An independent claim is necessarily broader than a dependent claim. That is, relatively few elements limit the scope of a broad, independent claim, so that the patentee has the right to exclude others

¹⁴ See Amended Particulars of Claims at 2-3.

¹⁵ *Id.* at 4.

¹⁶ U.S. Patent No. 7,169,196 (filed Nov. 6, 2002).

¹⁷ See *id.* at col.7.

¹⁸ See *id.* at col.7.

¹⁹ See *id.* at col.1.

²⁰ See *id.* at col.2.

²¹ See *id.*

²² See e.g., Patent Cooperation Treaty art. 3, 6, June 19, 1970, 35 U.S.C. § 351, 1980 Austl. T.S. No. 6 [hereinafter “PCT”]; See also Paris Convention for the Protection of Industrial Property art. IV, July 14, 1967, 21 U.S.T. 1583, 828 U.N.T.S. 305.

from practicing (*i.e.*, making, using, or selling, a wide range of subject matter). Many jurisdictions, including Europe and the United States, carefully review the claims of an application prior to issuing a patent, to ensure that the manifestations, or embodiments, of an invention as claimed are novel²³ (have not been set forth before) and are not obvious to one of ordinary skill in the art (represent an “inventive step” in European practice).²⁴ Nevertheless, even after a patent has issued, a claim can be contested in a later court proceeding.²⁵ Therefore, in order for the patentee to have a “fall back” position, should a broad claim later be found invalid, a patent often includes additional claims of narrower scope. Such narrower claims can include more elements. That is, in seeking to enforce the claim in court against an accused infringer, the patentee must show that the actions of the accused meet more requirements. Thus, broader claims are more valuable to a patent owner, but may be more vulnerable to attack as being invalid. Narrower claims have more limited value, but may prove more robust if challenged.

A competitor may intentionally “design around” the claims of a patent, in order to avoid infringing them. To design around a claim, the competitor will develop a material, device, or process that does not include all of the limitations (requirements) of the claim. In general, unless the material, device, or process includes each and every one of the limitations of the claim, it will not infringe the claim.²⁶ As such, there is nothing illegal or improper about a competitor attempting to design around a claim; such activity can, in fact, be viewed as an aspect of the innovation which the patent system is intended to stimulate. Of course, a competitor does assume the risk that if the patentee asserts a patent in a lawsuit, a court may find that the competitor’s product or process does infringe a claim (*i.e.*, there was an unsuccessful design around). A competitor could also adopt the strategy of attempting to design around a narrower claim of a patent and plan to argue that the broader claims are invalid.

A patent gives its owner the right to prevent certain activities of others, but does not provide the owner with the right to practice the subject matter claimed. This readily stated, but somewhat counterintuitive nature of a patent can be illustrated by briefly considering an example. If company A holds a patent on gasoline in general, and company B holds a patent on a fuel that includes an additive mixed with gasoline, then neither company A nor company B can sell the gasoline that has the additive without the consent of the other. Of course, this is just an illustrative example, because gasoline in general is now in the public domain. Company A’s patent on gasoline “blocks” company B from making, using, or selling the fuel that has the additive mixed with gasoline. Company B’s patent can also be viewed as a “blocking patent,” because it can be used to block company A from making, using, or selling gasoline with the additive. In a design around, company B would instead develop a fuel that is not gasoline as claimed in company A’s patent.

IV. HAS OXONICA “DESIGNED AROUND” NEUFTEC’S PATENT?

Given that the U.K. High Court of Justice has not yet issued a decision, public information on the composition of Oxonica’s Envirox 2 additive and other aspects of the *Oxonica* case is limited. Nevertheless, the information that is available from the issued patents and public patent prosecution histories provides an instructive, albeit somewhat speculative, setting for considering aspects of patent strategy for nanotechnology innovations.

²³ See *e.g.*, 35 U.S.C. § 102 (2007), available at http://www.uspto.gov/web/offices/pac/mpep/consolidated_laws.pdf; See also PCT art. 33.

²⁴ See 35 U.S.C. § 103; PCT art. 33.

²⁵ See *e.g.*, 35 U.S.C. § 141 (2007). In the U.S., for example, people can challenge the validity of a claim if it does not satisfy specific statutory requirements. See 35 U.S.C. §§ 101-103, 112.

²⁶ A detailed discussion of the “doctrine of equivalents,” which under certain conditions can expand the scope of a claim beyond what it literally recites, is outside of the scope of this article.

The broad claims of Oxonica's U.S. Patent No. 7,169,196 do not include the limitation of requiring an alkyl carboxylic anhydride coating, as do all claims of Neuftec's U.S. Patent No. 7,195,653 and European Patent No. 1 299 508. If Oxonica's Envirox 2 fuel additive has a coating that does not fall within the class of alkyl carboxylic anhydrides, or does not have any coating, then the Oxonica fuel additive would not include all limitations (requirements) of the Neuftec patent claims. Thus, it could in that case be a successful design around the Neuftec patent. A successful design around by Oxonica could raise the question of whether Neuftec should have sought broader protection, for example, by limiting the claims to a broader class of coatings than alkyl carboxylic anhydrides.

However, a brief review of the art of additives for fuels and lubricant oils is instructive. Alkenyl succinic anhydrides, for example, are commonly added to fuels (*e.g.*, diesel oil and gasoline) and lubricant oils. Such alkenyl succinic anhydrides are favored as additives for several reasons: (1) they dissolve readily in the fuel or oil; (2) they have low solubility in water, which may preclude their attracting water; and (3) they can react with unwanted water to inhibit corrosion. The additive dodecyl succinic anhydride is an example of an alkenyl succinic anhydride.²⁷

Dependent claims of the Neuftec patents specifically include the limitation of particles coated with dodecyl succinic anhydrides. The Neuftec patents may be quite valuable despite their limitation to alkyl carboxylic anhydride coatings in general and dodecyl succinic anhydride coatings in particular. The use of such compounds or related compounds as additives in the motor fuel and lubricant industry may facilitate the commercial adoption of fuel additives as claimed by Neuftec. Motor vehicles represent a substantial capital investment by their owners, which results in cautious and conservative selection of fuel and lubricant additives. Furthermore, dodecyl succinic anhydride can react with water to form a di-acid. This di-acid can in turn react with metal ions like calcium or magnesium.²⁸ It is interesting to speculate whether one reason for dodecyl succinic anhydride's use as a coating for Neuftec's lanthanide oxide particles is that it can form a strong bond with the lanthanide atoms, so as to effectively solubilize the particles and isolate the lanthanide oxide catalyst from the fuel during storage, up until the time the particles are exposed to the high temperatures of a combustion chamber.

If Neuftec's alkyl carboxylic anhydride coatings in general and dodecyl succinic anhydride coatings in particular add substantial economic value to its fuel additives as patented, Oxonica may have difficulty in effectively designing around the Neuftec patents. It would likely be of little benefit to Oxonica to develop an alternative to Neuftec's additive, if such an alternative does not provide at least some of the Neuftec additive's benefits. These considerations highlight the importance of an applicant and the patent attorney to be knowledgeable about the innovative technology they seek to patent as well as the broader industry in which the innovation may find commercial application. Such broader knowledge can allow the applicant to present claims that are valid, difficult to design around, and commercially valuable.

V. DOES NEUFTEC'S PATENT "BLOCK" OXONICA'S PRODUCTS?

If the alkyl carboxylic anhydride coatings in general and dodecyl succinic anhydride coatings in particular claimed in the Neuftec patents add substantial utility and economic value to the Neuftec fuel additives, then the Neuftec patents may act as blocking patents with respect to Oxonica's innovations

²⁷ Pentagon Chemical Specialties, "n-Dodecyl succinic anhydride, n-DDSA," http://oil-fuel-additives.pentagon-chemical-specialties.com/pages/chemical/chemical=ndodecyl_succinic_anhydride/industry=oilfuel_additives (last visited Sept. 4, 2008).

²⁸ Stan Jenkins, *The Use of Alkenyl Succinic Anhydride for Sizing Recycled Fibres*, TECH. ASSOC. PULP & PAPER INDUS. S. AFRICA (2001), available at http://www.tappsa.co.za/archive/Journal_papers/The_use_of_alkenyl_succinic/the_use_of_alkenyl_succinic.html.

claimed in U.S. Patent No. 7,169,196. It is interesting to note that although Oxonica's broad claims do not include the limitation of a coating, dependent claims include the limitation of a coating with "an organic acid, anhydride, or ester or a Lewis base"²⁹ or "oleic acid or dodecylsuccinic anhydride."³⁰ Dodecylsuccinic anhydride differs from dodecenylsuccinic anhydride only in that the carbon "tail" does not include any double bonds. Thus, the "dodecylsuccinic anhydride" coating limitation of the Oxonica patent is similar to the "dodecenyl succinic anhydride" limitation of the Neuftec patent.

Oxonica's patent may be valuable in that the doping of cerium oxide particles may enhance their catalytic properties as a fuel additive. However, if an alkyl carboxylic anhydride coating is crucial for the adoption of the particles as a motor fuel additive, then Oxonica's ability to realize economic gain from its patent and products based thereon may be constrained by Neuftec's enforcement of its patents.

At the same time, although Neuftec can practice or license its innovation of using alkyl carboxylic anhydride coated lanthanide particles, it cannot dope cerium oxide particles as patented by Oxonica unless Oxonica grants Neuftec permission. If such doping allows for substantial enhancement of catalytic properties, Neuftec's fuel additive will be less effective. Thus, the gain Neuftec can realize from practicing its innovation would not be maximized. In some economic circumstances, it may be acceptable to realize suboptimal gain. In other circumstances, however, to not realize full gain may render the value of the product less than the cost to produce the product. Moreover, a suboptimal product can be more readily superseded by another product, perhaps developed by a party other than Oxonica or Neuftec, shortening the time over which Neuftec can sell or license its fuel additive.

Thus, the patents owned by Oxonica and Neuftec may effectively be "mutually blocking." Such a situation in which the hands of both patent owners are tied, or at least, constrained, suggests that the parties have a strong incentive to reach an agreement to cross-license their patents or agree to license their patents to a third party or joint venture.³¹ Such an agreement would allow both parties to maximize their realization of economic gain from practicing their innovations.

On the other hand, each party will not necessarily perceive the economic gain that it will realize by licensing the other's patent as equal to what the other will realize by licensing the party's patent. In such a case, the party may demand a royalty payment or other compensation for licensing its patent, which it perceives as more valuable, to the other. If the parties perceive the relative economic values of their patents differently, it may be difficult to reach an agreement. Litigation may provide a route by which the parties seek to establish the relative strength and, therefore, the relative worth of their patents. Thus, as seems to be the case here, litigation may be part of an overall strategy of attaining a favorable resolution.

VI. CONCLUSIONS

Presently, a full picture of the motivations, strengths, and weaknesses of Oxonica's and Neuftec's positions in the litigation presently before the U.K. High Court of Justice is unavailable. But, the case raises interesting questions of patent strategy, for example, developing blocking patents and designing products around such patents. This is similar to the situation of a given party confronted with a competitor's patent—only rarely will such a party have full knowledge of the competitor's strengths and weaknesses. The best a party can do is to consider the likelihood of a number of scenarios consistent with the available facts.

²⁹ U.S. Patent No. 7,169,196 at claim 11.

³⁰ *Id.* at claim 12.

³¹ See e.g., Peter C. Grindley & David J. Teece, *Managing Intellectual Capital: Licensing and Cross-Licensing in Semiconductors and Electronics*, 39 CAL. MGMT. REV. 1 (1997) (discussing benefits of cross-licensing patents).